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ABSTRACT

The author presents a variation of Q-sort testing appropriate for the examination and quantification of responses to questions concerning teacher values and attitudes relating to teaching style. Specifically, the method is designed for use in examining the four "families" of teaching models developed in Joyce and Weil's taxonomy: social interaction, information processing, personal development, and behavior modification. The instrument, the Teaching Style Q-Sort (TSQS), consisted of twenty-eight statements designed to reflect positions consistent with the four families. Subjects, practicing teachers and students in university education classes, were asked to rank the twenty-eight statements from "most like my teaching" to "most unlike my teaching." A detailed analysis of the validity and reliability verification techniques employed to develop the instrument is presented. Suggested uses of the TSQS in teacher education are given, including: matching of teaching/learning styles; curricula and textbook selection; matching student developmental needs with teacher style; and as a research tool. (MJB)

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THE TEACHING STYLE Q-SORT: A DESCRIPTION OF ITS USES IN ASSESSING TEACHING STYLE

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"Variations in teachers' characteristics account for more variation in children's standardized performance in cognitive skills than do variations in any other characteristics of the school" (Coleman, 1970, p. 174). A study that involved 18,528 classroom observations in 112 school districts concluded that style of educational activity was the single strongest predictor of school system quality (Olson, 1971). McDonald (1976) estimated that teacher effects accounted for about 25% of the variance in pupil achievement. Despite the importance of the teachers' activity in the classroom, relatively few studies have been conducted in the area of teaching behaviors (Rosenshine, 1976). The majority of studies that have investigated the role of teacher activity have conceptualized the act of teaching on a structure/flexibility continuum, such as teacher centered vs. student centered, low level questioning strategies vs. high level questioning strategies, low inductive/deductive ratio vs. high inductive/deductive ratio, and expository vs. discovery (Crocker, Bartlett, and Elliot, 1976; Gage, 1976; Penick, Shymensky, Matthews, and Good, 1976; Wolfson, 1973).

Teaching Style

The criterion of success used in these studies was an achievement measure of some kind. Coleman (1970) stated that "student achievement is only one of a number of considerations in teacher performance" (p. 175). Mood (1970) observed that teacher attributes important for academic achievement may be different than those which were important for student achievement in personal development. Broudy (1972) distinguished three teaching styles based on the kind of results they achieved: didactics, heuristics, and philetics. The goal of didactic teaching was "the imparting and reinforcing of skill and knowledge" (p. 251). In heuristics, the teacher managed instruction so "that the student thinks for himself" (p. 252). "Concern for the pupils'

development both intellectually and as a person is the criterion in philetics" (p. 253).

Greene (1973) listed the following as ways of thinking about educational outcomes.

> Education, in one perspective, is a process of initiating young people into the ways of thinking and behaving characteristic of a culture into which they are born. In another perspective, it is the development of a person from innocence to experience, from the confines of childish immediacies to the open plains of conceptual thought. In still another, it is the effort of a community to recreate itself with the rise of each new generation and to perpetuate itself in historic time. (p. 13)

Joyce and Weil (1972) organized models of teaching into four families based on "different orientations toward man and the universe" (p. 8), or what educational outcomes are expected. These four families were:

1. Social interaction: In this family "the relationships of a person to his society or his direct relationships with other people" (p. 8) were emphasized. Priority was given to social relatiors and to the creation of a better society.

2. Information-processing: This family of models was concerned with how the students improved their information-processing abilities. "By information-processing we mean the ways in which people handle stimuli from the environment, organize data, sense problems, generate concepts and solutions to problems, and employ verbal and nonverbal symbols" (p. 9).

3. Personal: "The distinctive feature of this category is its emphasis on personal development as a source of educational ideas" (p. 10). These models often emphasize such individual oriented constructs as personal psychology, emotional life, self-concept, self-image, and creativity.

4. Behavior modification: These theories relied on "changing the external behavior of the student" (p. 10-11) and described "him in terms of extremely visible behavior rather than underlying and unobservable behavior" (p. 11).

In these systems as described by Broudy, Greene, and Joyce and Weil, the style changes as the criterion of success changes.

Assessing Teaching Style

In the research cited above, methodology was often ascertained by means of an interaction analysis system and has been described in terms of structure/flexibility

(Flanders, 1970). This construct was not an adequate way of measuring teaching style as described by Joyce and Weil, since the amount of structure can vary within any one of the families. Likewise models from different families can have similar amounts of structure (Joyce and Weil, 1972).

The present study allowed the investigator to examine questions related to values and attitudes and at the same time quantify the results. The method utilized a technique known as Q-sorting (Kerlinger, 1973). After a number of pilot studies the Teaching Style Q-Sort (TSQS) was developed to examine the aspect of teaching style described by Joyce and Weil.

The Teaching Style Q-Sort (TSQS)

The TSQS consisted of 28 statements (see Appendix A). These statements derived from the book Models of Teaching by Joyce and Weil (1972) were intended to reflect positions consistent with the four families described in the book. Seven statements were selected for each family. Teachers were asked to rank the 28 statements from those "most like my teaching" to those "most unlike my teaching," using a Q-sorting method illustrated by the response sheet (see Appendix B). Responses in the first column were given a rank score of 7, those in the second column a rank score of 6, and so on to the seventh which has a rank score of 1. A total score for each family was calculated by adding the rank scores for the seven statements that represented that family.

Sample:

The subjects in this study were practicing teachers who were either participants in workshops sponsored by a private corporation or students in university classes in education. The sample was determined by the instructor's willingness to allow data to be collected. The teachers represented all grade levels and a wide variety of disciplines.

Validity:

Validity data were collected from several sources. Content validity came from the members of a class which used the book Models of Teaching as a text. Class members judged the statements as to which family they represented. Evaluations were conducted by seven groups of about four members each. The seven groups of students matched from 78% to 96% of the statements with the correct family. Overall 90% of the statements were matched with the right family.

Additional validity data was gathered after giving the TSQS to four classes of students trained to use behavior modification methods in teaching. Students were expected to show a preference for the Behavior Modification family. Thirty-three students took the TSQS for this validation. Nineteen out of thirty-three students had a higher score from the Behavior Modification family than any other family. The mean score for the Behavior Modification family from this group was 32.27. The mean score for the Behavior Modification family from a sample of 541 was 25.71. A t test procedure for different sample sizes was used to examine the hypothesis that the mean difference was not statistically different at the p = 0.01 level of significance. The t value was 8.39 (significant at 0.01 level). The hypothesis of no difference was rejected. The mean difference was statistically different (Steel and Torrie, 1960).

Another source of information to ascertain validity was the data gathered from a sample of 541 TSQS respondents. The 28 statements of the TSQS were used as the variables in a factor analysis. Rao's canonical factoring was used as a factoring method. The quartimax method of orthogonal rotation was employed to rotate the factor matrix. This procedure was selected in an effort to simplify the rows of the factor matrix, a variable will load high on one factor but almost zero on all of the other factors, so that most of the variance of the factor was accounted for by that varible. As a result, several variables within a factor may have

high factor loadings (Kim, 1975). The method used to approximate the number of significant factors involved plotting eigenvalue against their associated factors. The point where the slope changed was used as an approximation of the numbered significant factors (Comrey, 1973).

The application of factor analysis in this case was confirmatory, i.e., "the testing of hypothesis about the structure of variables in terms of the expected numbered of significant factors and factor loadings"(Kim, 1975, p.469). In this study, factor analysis was used to examine the hypothesis that the factors would be made up of groupings of variables from the same family (Comrey, 1973). Factor loadings greater than 0.30 and less than -0.30 were considered significant (Comrey, 1973).

A factor analysis of the 28 statements in which the number of factors to be generated was not specified yielded a factor matrix of 11 factors. This matrix was used to estimate the number of significant factors. Since the method used to provide an approximation of the numbered significant factors indicated a range rather than a point, three separate factor analyses were examined: with three-, four-, and five-factor solutions. The results of these analyses were summarized in Tables 1-3. Only significant factor loadings were recorded. In the analysis only pure variables were considered. A pure variable had a significant factor loading on only one factor while a complex variable had significant factor loadings on more than one factor (Comrey, 1973).

The factor analysis showed that the statements were selected in groups that can be identified with the four families of teaching style. In most cases a factor was made up of statements with positive factor loadings from one family and negative factor loadings from another family or statements from only one family. Occasionally a factor was more complex, such as factor 1 from the five-factor solution (Table 1). Positive factor loadings for both Behavior Modification and Information-Processing statements appeared in this factor. The same phenomena was seen

Table 1

Significant Factor Loadings for the 28 TSQS Statements When a Five-Factor Solution was Specified

Variable (Family)	Factor 1	2	3	4	5
S 1 (P)	-0.40		-0.53		
S 2 (SI)					
S 3 (IP)					
S 4 (BM)	0.42*				
S 5 (P)	-0.37*				
S 6 (SI)					
S 7 (IP)				0.41*	
S 8 (BM)			0.35*		
S 9 (P)			-0.38*		
S10 (SI)					
S11 (IP)					
S12 (BM)			0.38*		
S13 (P)	-0.33*				
S14 (SI)		0.40*			
S15 (IP)					
S16 (BM)					-0.37*
S17 (P)				-0.64*	
S18 (SI)		0.48*			
S19 (IP)	0.38*				
S20 (BM)		-0.33*			
S21 (P)			-0.44*		
S22 (SI)		0.51*			
S23 (IP)	0.31*				
S24 (BM)					-0.42*
S25 (P)					
S26 (SI)					
S27 (IP)	0.62*				
S28 (BM)					-0.35*
Factor Identification	Information Processing, Negative Personal	Social Interaction	Behavior Modification, Negative Personal		Behavior Modification

*Pure Variable

Table 2

Significant Factor Loadings for the 28 TSQS Statements When a Four-Factor Solution was Specified

Variable (Family)	Factor 1	Factor 2	Factor 3	Factor 4
S 1 (P)			0.33	-0.35
S 2 (SI)				
S 3 (IP)	0.36*			
S 4 (BM)			-0.49*	
S 5 (P)	-0.38*			
S 6 (SI)			0.37*	
S 7 (IP)	0.33*			
S 8 (BM)		0.36*		
S 9 (P)		-0.31		-0.33
S10 (SI)				
S11 (IP)				
S12 (BM)		0.39*		
S13 (P)				
S14 (SI)				0.33*
S15 (IP)				
S16 (BM)				
S17 (P)	-0.53*			
S18 (SI)				0.35*
S19 (IP)				
S20 (BM)			-0.31*	
S21 (P)				-0.51*
S22 (SI)				0.48*
S23 (IP)	0.37*			
S24 (BM)		0.32*		
S25 (P)	-0.33*			
S26 (SI)				
S27 (IP)	0.38		-0.49	
S28 (BM)		0.40*		
Factor Identification	Information Processing, Negative Personal	Behavior Modification	Flexible, Structured	Social Interaction, Negative Personal

*Pure Variable

Table 3

Significant Factor Loadings for the 28 TSQS Statements When a Three-Factor Solution Was Specified

Variable (Family)	Factor 1	Factor 2	Factor 3
S 1 (P)	-0.32	0.34	-0.32
S 2 (SI)			
S 3 (IP)	0.37*		
S 4 (BM)		-0.37*	
S 5 (P)	-0.43*		
S 6 (SI)		0.31*	
S 7 (IP)			
S 8 (BM)			
S 9 (P)		0.31	-0.35
S10 (SI)			
S11 (IP)		-0.32*	
S12 (BM)			
S13 (P)	-0.31*		
S14 (SI)			0.33*
S15 (IP)	0.31*		
S16 (BM)			
S17 (P)	-0.40*		
S18 (SI)			0.35*
S19 (IP)	0.33*		
S20 (BM)		-0.42*	
S21 (P)			-0.54*
S22 (SI)			0.40*
S23 (IP)	0.41*		
S24 (BM)			
S25 (P)	-0.31*		
S26 (SI)			
S27 (IP)	0.46*		
S28 (BM)			
Factor Identification	Information Processing, Negative Personal	Flexible, Structured	Social Interaction, Negative Personal

*Pure Variable

in Factor 2 of the three-factor solution (Table 3). The relationship of Personal and Social Interaction statements also shown in this factor was suggested in Factor 3 of the four-factor solution (Table 2). These three factors may have indicated a closer relationship between Social Interaction and Personal teaching styles and Information-Processing and Behavior Modification styles. Additional validity was suggested by the use of the TSQS as a pre-test post-test for a series of seven workshops designed to promote a more personal style of teaching. The post-test scores for the Personal family were significantly higher, $p = 0.03$ to 0.001 in all seven workshops.

Reliability

Internal Consistency:

Pearson product moment correlations were used to calculate item-total correlations which indicated internal consistency. Each statement was correlated which indicated internal consistency. Each statement was correlated with the total score of the family which it represents. All correlations were significant at the 0.01 level, and ranged from 0.31 to 0.56. In addition, each correlation was evaluated using the criteria established by Ebel(19). All of the items except statement 11 and statement 13 were classified as very good ($r \geq 0.40$). Statements 11 and 13 were classified as reasonable ($0.30 \leq r < 0.40$).

Test-retest:

Kendall's tau correlation coefficients were used to correlate the test-retest scores. The rank order of the four families from the TSQS from the first administration were correlated with those of the second administration. The correlation coefficients ranged from 0.44 for the Information-Processing family to 0.65 for the Behavior Modification family. All correlation coefficients were significant at the 0.01 level or lower.

Uses of the TSQS

In the text Models of Teaching, Bruce Joyce and Marsha Weil (1972) have asserted that teachers should use a variety of teaching styles. Other educators such as James Coleman (1970), Alexander Mood (1970), and Harry Broudy (1972) have stated similar positions. These views were established on the premise that students differ in the ways they learn and that teachers differ in the ways they teach.

In the monograph, Matching Models in Education, David Hunt (1974) proposed a way to facilitate learning by matching the educational environment of the student with the student's learning style. Several studies have demonstrated the desirability of matching aspects of learning style and teaching style in improving academic achievement (Crocker, et. al., 1976; Rich, 1973; Roberts, 1975; Rosenshine, 1976; Smith, 1973; Tallmadge and Shearer, 1971; Walters and Sieban, 1974; White and Howard, 1970).

Another area in which teaching style may be considered important is in curricula and textbook selection. Textbook authors and curriculum developers have certain philosophies of education that may differ with the philosophies of other authors and developers (Joyce and Weil, 1972). These philosophies may be reflected in the teaching styles needed to successfully use curricular materials. For example, teachers who have a flexible style of teaching may experience difficulty in using a text which requires more rigidity or structure. Programs that reflect different philosophies of education can be found in any subject area and many variables come to play in selecting curricula. As a result many school systems do not systematically select texts or curricular programs in ways consistent with educational philosophy. Therefore, teachers often must use programs that are based on divergent philosophies. This fact gives an additional incentive to teachers for learning how to use a variety of teaching styles.

Meeting the needs of individual students as outlined in various state and

national programs provides teachers with yet another reason to be able to use different teaching styles. Office of Civil Rights guidelines for bilingual education programs have mandated that teachers use teaching styles that will effectively meet diagnosed educational needs (OCR sets guidelines, 1975). Mainstreaming or providing students with the least restrictive educational environment will bring students with various learning styles into the classroom. Teachers must respond to the needs of special children differently than those used in more traditional settings.

The TSQS was designed to allow teachers to examine their own teaching style in terms of the Personal, Social Interaction, Information-Processing and Behavior Modification families described by Joyce and Weil (1973).

The TSQS has been applied successfully in a number of teacher education situations. It has proved to be a useful tool in both undergraduate and graduate education classes. In these classes the TSQS has been employed to allow teachers an opportunity to examine their teaching style, as an introduction to teaching styles, and as a means of bringing together class participants for group activities. Other ways in which the TSQS has been used include in-service workshops, seminars dealing with a particular teaching style, and headstart training programs. Modifications of the TSQS have been used with such specialized classes as architecture and workshops in educating patients and nurses.

The TSQS has also been used as a research tool. Data from a sample of 541 teachers indicate that the mean scores for each family are Personal, 30.70; Social Interaction, 28.22; Information-Processing, 25.71; and Behavior Modification 27.43. The standard deviations for each family ranged from 4 to 5. The TSQS has been used to explore relationships between teaching style and selected teacher variables.

The psychological construct conceptual level has been used to describe variations in teaching style (Hunt, 1970; Hunt and Joyce, 1967; Joyce, Lamb, and Sibol,

1966; Murphy and Brown, 1970; Spring, Koenigs and deCharms, 1974; Tinsman, 1970; Yarger, 1976). Conceptual level is an indication of how a person gathers information from the environment and processes those data into alternative actions (Harvey, Hunt and Schroeder, 1961). Low conceptual level people gather information from a limited number of sources and, subsequently, generate few solutions. High conceptual level people gather data from a variety of sources and are able to generate multiple alternatives as a course of action. The research relating conceptual level and teaching style indicate positive relationships with the Personal and Social Interaction styles and negative relationships with the Information-Processing and Behavior Modification styles.

Another study used the teachers values as measured by the Rokeach Value Survey (Rokeach, 1967). Significant relationships were indicated for the values equality and broadminded. Teachers who scored high the the Behavior Modification family ranked equality significantly higher than teachers who scored high in one of the other families. Information-Processing teachers ranked broadminded lower than other teachers.

Grade level taught was associated positively with Information-Processing and Social Interaction and negatively with Personal and Behavior Modification. Years of teaching experience had a significantly positive correlation with Information-Processing teachers and a negative correlation with Personal teachers.

Subject matter may be a variable that has an effect on teaching style. A significantly high positive correlation was found between Special Education teachers and the Behavior Modification family. Preliminary data from a current study indicates that teachers in alternative programs score significantly higher for the Personal family.

APPENDIX A

(Letters in parenthesis refer to family identification and were not included on original TSQS.)

1. Students should have control over the selection of activities so that he/she selects his/her own instructional outcomes (P).
2. Education should emphasize the importance of group problem solving (SI).
3. Concepts are the basis of knowledge (IP).
4. The teacher's task is one of establishing behaviors and then bringing those behaviors under the control of the environment. (BM)
5. Instruction should emphasize the maximization of unique personal development (P).
6. The social involvement of group investigation is a route to academic inquiry (SI).
7. Instruction should improve the student's ability to process information (IP).
8. Effective reinforcement should immediately follow a response (BM).
9. The teacher should recognize that the individual is capable of handling his/her own learning in constructive ways (P).
10. The teacher should take a role as a part of the group and be an active inquirer with the students (SI).
11. Students should recognize the tentative and emergent nature of knowledge (IP).
12. The sequence of learning should be broken down into small units to assure success at each step (BM).
13. Teachers should provide environments which are likely to increase the student's capacity to develop himself/herself (P).
14. The school has to be an active participant in the continuing development of culture (SI).
15. The "academic disciplines have a structure of concepts which form the information processing system of the discipline" (IP).
16. Positive and negative reinforcement both can increase response probability (BM).

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*17. Teachers should keep "the students' feelings and problems at the center of the teaching process" (P).

18. In a complex, interdependent world, the individual's well-being is closely related to the larger social structure (SI).

19. The task of the school is to identify clear, stable, and organized bodies of knowledge within the disciplines (IP).

20. Teachers are able to define all goals and objectives in terms of observable benavior (BM).

*21. The "student must take responsibility for initiating and maintaining learning activities" (P).

22. Instruction should emphasize the relationships of the person to society (SI).

23. Good lectures and demonstrations can lead to meaningful learning (IP).

24. Programmed instruction can be successfully used with any subject area, grade level, and behavior (BM).

*25. The teacher "must be acceptant of all responses in order to insure that students feel no external judgments on their creative expression" (P).

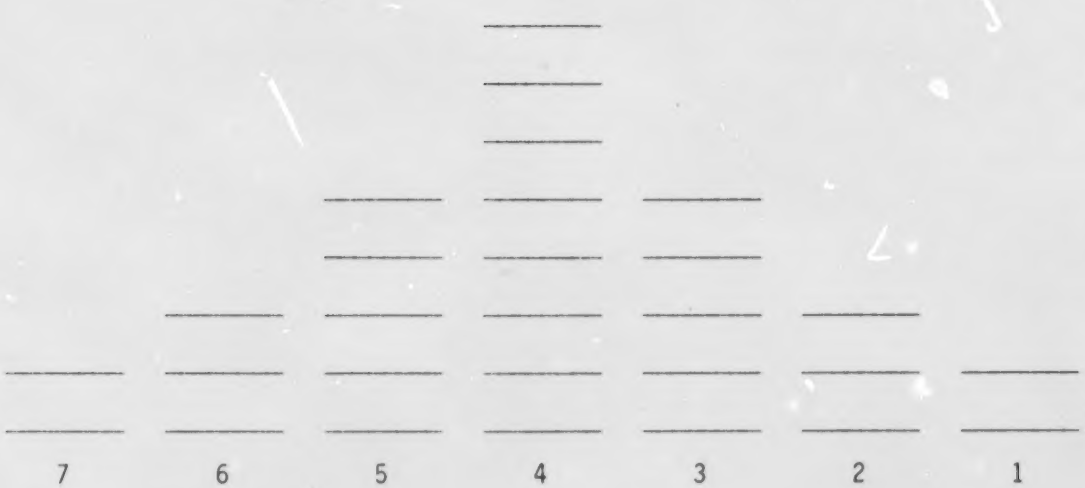
26. Intellectual operations are learned when students are engaged in active dialogue (SI).

27. The role of the teacher is to retain control of the intellectual structure of the classroom (IP).

28. Behavior modification can be used to extinguish objectionable behavior as well as to establish behavior responses in subject matter areas (BM).

*Bruce Joyce and Marsha Weil, MODELS OF TEACHING c 1972. Reprinted by permission of Prentice-Hall, Inc., Englewood Cliffs, NJ.

APPENDIX B



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